

IN THE CLAIMS:

Please cancel claim 31 without prejudice or disclaimer, and add new claims 32-61. After the entry of the instant amendment, the pending claims will be:

Claims 1-31 (cancelled).

32. (new) A method of filling and overlaying intertracks or zones in hollows with respect to a surface of a substrate or of a printed circuit, the hollows being closed at an opposing surface of the substrate, the method comprising:

displacing a viscous filling product, at the zones to be filled, using the hydrodynamic effect of a roller in rotation of which the axis is perpendicular to a movement of the substrate with respect to the roller, and parallel to the substrate and generating a pressure differential between the downstream and upstream of the roller with the aid of the concerted action of the roller and of a scraping element in order to evacuate, in the form of bubbles, the gas present in the zones in hollows and to substitute it by filling product; and

using the scraping element to adjust the thickness of the product at the surface of the substrate.

33. (new) The method of filling according to claim 32 wherein it comprises successively:

making the zone to be filled impermeable to entry of gas exterior to the zone, by spreading the product at the surface of the substrate in order to isolate the zones to be filled from the exterior gas and to make the product available;

displacing the product at the zones to be filled in order to evacuate, in the form of bubbles, the gas present in the zones to be filled under the filling product;

substituting the gas evacuated in the form of bubbles, by the filling product; and adjusting the thickness of the product at the surface of the substrate.

34. (new) The method of filling according to claim 32 wherein the displacing of the product at the the area to be filled is obtained by a hydrodynamic effect.

35. (new) The method of filling according to claim 32 wherein it comprises blocking the gas bubbles extracted by the displacing means of the filling product, with the scrapping means so that they are not re-drawn in the zones to be filled.

36. (new) The method of filling according to claim 32 wherein the zones to be filled have lengths in the range of several millimeters to several decimeters, the depth of a zone relative to the surface divided by the smallest aperture dimension being less than one.

37. (new) The method of filling according to claim 32 wherein the speed of movement of the filling product is adjustable.

38. (new) The method of filling according to claim 32 wherein the displacing of the filling product at the the zone to be filled is obtained by a hydrodynamic effect of a roller in rotation of which the axis is perpendicular to the movement of the substrate with respect to the device and parallel to the substrate and according to the direction such that the tangential movement of the roller at the the zone to be filled is opposed to the direction of displacement of the substrate.

39. (new) The method of filling according to claim 32 wherein it associates a means for displacement in translation of the substrate to the action of a filling head resting on the substrate and containing the filling product , the head permitting the generation of a positive pressure differential between the downstream means for displacing of the product due to the concerted action of the means for displacing of the filling product and a scraping element forming in this manner a confined downstream zone of surge pressure totally occupied by the filling product and the

means for displacing causes a circulation of the filling product at the the zone to be filled in the direction opposed to the displacement of the substrate with respect to the filling head forming in this manner an upstream zone of reduced pressure in order to evacuate the gas present in the zones to be filled and to replace it by filling product as the substrate is displaced.

40. (new) The method of filling according to claim 32 wherein the roller assuring the displacement of the filling product is contained in the above-mentioned filling head.

41. (new) The method of filling according to claim 39 wherein the speed of rotation and/or the diameter of the abovementioned roller contained in the filling head are adjustable in order to adjust the pressure differential of the confined zone of surge pressure with respect to the zone of reduced pressure permitting control of the running of the product under the scrapping element at the the zones to be filled and to compensate for the trailing effect of the scrapping element.

42. (new) A filling device, configured to operate without mask or silk screen, for zones located in hollows with respect to a surface of a substrate and closed on an opposing surface of the substrate and extending from several millimeters to several decimeters, the depth of a zone relative to the surface divided by the smallest aperture dimension being less than one, the filling device configured to be in translation relative to the surface of the substrate and implementing the filling method according to claim 32 wherein it comprises, in the order according to the direction of relative displacement of the filling device with respect to the substrate:

- a spreading element for the filling product at the surface of the substrate,
- a displacing element for the filling product at the the zone to be filled, the displacing element acting in accordance with a hydrodynamic effect of a roller in rotation having an axis perpendicular to the movement of the substrate with respect to the device and parallel to the substrate, and generating a pressure differential between

the downstream and upstream of the roller, with the aid of the concerted action of the roller and of a scraping element in order to evacuate in the form of bubbles the gas present in the zones in hollows and to substitute it by filling product, and

an element for adjusting the thickness or scraping the excess of the filling product, in a manner such that the above mentioned filling product remains constantly in contact with the zone to be filled from the beginning of the filling up to the scraping of the excess.

43. (new) The filling device according to claim 42 wherein the displacing element includes a roller in rotation.

44. (new) The filling device according to claim 42 wherein the device is symmetric in order to be able to operate in the two directions and to be implemented on a silk screen machine.

45. (new) The filling device according to claim 42 wherein the relative movement in translation of the filling product relative to the surface of the substrate is obtained by maintaining the filling device for the product fixed while the substrate is moving.

46. (new) The filling device according to claim 42 further including a scraper for blocking the bubbles extracted by the abovementioned displacing element.

47. (new) The filling device according to claim 42 further including a filling head comprising :

- a) a chamber containing the filling product, the chamber being delimited downstream by a scraper inclined at an angle less than or equal to 90° and upstream by a scraper inclined in the same direction at an angle equal to or greater than 90° ,
- b) a roller placed between the scrapers for displacing of the product and turning in the direction such that the tangential movement of the roller at the zones to be filled is

opposed to the movement in translation of the substrate with respect to the filling device, and

a means for displacement in translation of the substrate, permitting a continuous running of it under the above-mentioned filling head.

48. (new) The filling device according to claim 32 wherein the above-mentioned means for displacing in translation of the substrate is a conveyor belt.

49. (new) The filling device according to claim 47 wherein the filling head is equipped with a sealing element arranged in its lower part.

50. (new) The filling device according to claim 47 wherein the above mentioned filling head is adjustable in length according to the width of the substrate to be treated.

51. (new) The filling device according to claim 47 wherein the above mentioned filling head is adapted to the width of the substrate to be treated and that a system of rapid fixation permits switching from one filling head to another.

52. (new) The filling device according to claim 47 wherein the above mentioned roller comprises fins parallel to the axis of the roller in order to accentuate the displacement of the filling product.

53. (new) The filling device according to claim 47 wherein the above-mentioned scraper is tangentially placed on the upper part of the displacing element in a manner to cause the evacuation of the air bubbles.

54. (new) The filling device according to claim 43 wherein the above-mentioned substrate is a printed circuit.

55. (new) The filling device according to claim 43 wherein the above-mentioned filling head containing the filling product is closed.

56. (new) The filling device according to claim 43 wherein the above mentioned filling head containing the filling product is closed with creation of a level of vacuum in its part situated above the filling product to promote the evacuation of the extracted air from the zones to be filled of the substrate.

57. (new) An apparatus associated with a filling device according to claim 43, the apparatus comprising :

- a conveyor that facilitates the translation of the substrates below the filling head;
- a feeding conveyor situated upstream from the conveyor to transport the substrates to be filled to the conveyor below the filling head; and
- an evacuation conveyor situated downstream from the conveyor for recuperating the substrates that have just been filled by the filling head.

58. (new) The apparatus according to claim 57 wherein the conveyor includes an endless belt and that engaged around first and second cylinders, the first cylinder driving, and is associated at the entrance to pressing cylinders arranged above the belt in order to maintain under pressure and to drive the substrates that have just exited the admission conveyor onto the belt below the filling head.

59. (new) The apparatus according to claim 57 wherein the feeding conveyor is the roller type and comprises a centering device formed from two guiding rails bordered on the interior by rolling rollers and that, mounted adjustable in width, permit to appropriately position the substrates before their admission under the filling head on the conveyor.

60. (new) The apparatus according to claim 57 wherein it comprises a

continuous cleaning device for the endless belt that, constituted by a blade arranged to push onto the external surface of the belt under the conveyor to form scrapers.

61. (new) The apparatus according to claim 57 wherein the evacuation conveyor is of the belt type and permits transportation of the substrates that have just been filled by the head to another treatment unit.